

Iowa, a barometer reading of 29.28 inches being reported at Omaha. During the 23d storm warnings were ordered for the Louisiana and Texas coasts and on the evening of that day for the Atlantic coast from Cape Henry to Eastport, and high winds occurred as forecast. During the next 24 hours it advanced to Lake Superior and by the morning of the 25th was over the Grand Banks of Newfoundland. Precipitation attending this disturbance was confined to the Mississippi and Ohio Valleys and the Lake Region. Severe local storms occurred in portions of Kansas, Nebraska, Iowa, Illinois, and Indiana. Discussion of the tornadoes that visited Omaha, Nebr., and Terre Haute, Ind., follow at the end of this article.

The following extract from the weekly forecast issued Sunday, March 23, and referring to this storm, is worthy of note:

The distribution of barometric pressure over the Northern Hemisphere is such as to indicate a continuance of abnormal storm activity and marked fluctuations in temperature in the United States the coming week. A storm central Sunday over the Rocky Mountain region will move rapidly northeast, accompanied by shifting gales;
* * *

After the passage of this storm, pressure remained below the seasonal average over the southern Rocky Mountain region and Texas, while the high pressure area over the Canadian Northwest still persisted. On the morning of the 24th a low center was over western Colorado and another over western Texas. By the morning of the 25th the Colorado storm was central over northwestern New Mexico, while the Texas disturbance had advanced northeastward with increased intensity to a position over Arkansas, and another low had appeared over northern Ohio and western Pennsylvania. Pressure remained low over southern Texas, and storm warnings were ordered during the morning of the 25th for the Texas and Louisiana coasts and high winds occurred as forecast. During the afternoon of that day storm warnings were also issued for the Atlantic coast from Cape Hatteras to Eastport, and brisk to high winds occurred over that region. On the morning of the 26th low centers were over western New York, northern Louisiana, and the mouth of the Rio Grande and storm warnings were continued for the west Gulf and ordered on the east Gulf coast as far east as Cedar Keys. During the evening of that day warnings were ordered displayed on the Atlantic coast from Jacksonville to Eastport and were repeated on the 27th for the Atlantic coast from Hatteras northward. General gales occurred over the territory indicated in the orders. On the evening of the 26th a low was over Kentucky (probably the one that was over northern Louisiana on the morning of that day) with much increased energy. By the evening of the 27th there were two lows, one over western Maryland and the other over western New York. During the 24 hours following the storms passed to the mouth of the St. Lawrence River. This series of disturbances caused general precipitation in the form of rain and snow from the eastern slope of the Rocky Mountains to the Atlantic coast, heavy rains being reported in the Ohio Valley. In connection with these disturbances local storms were reported in portions of Arkansas.

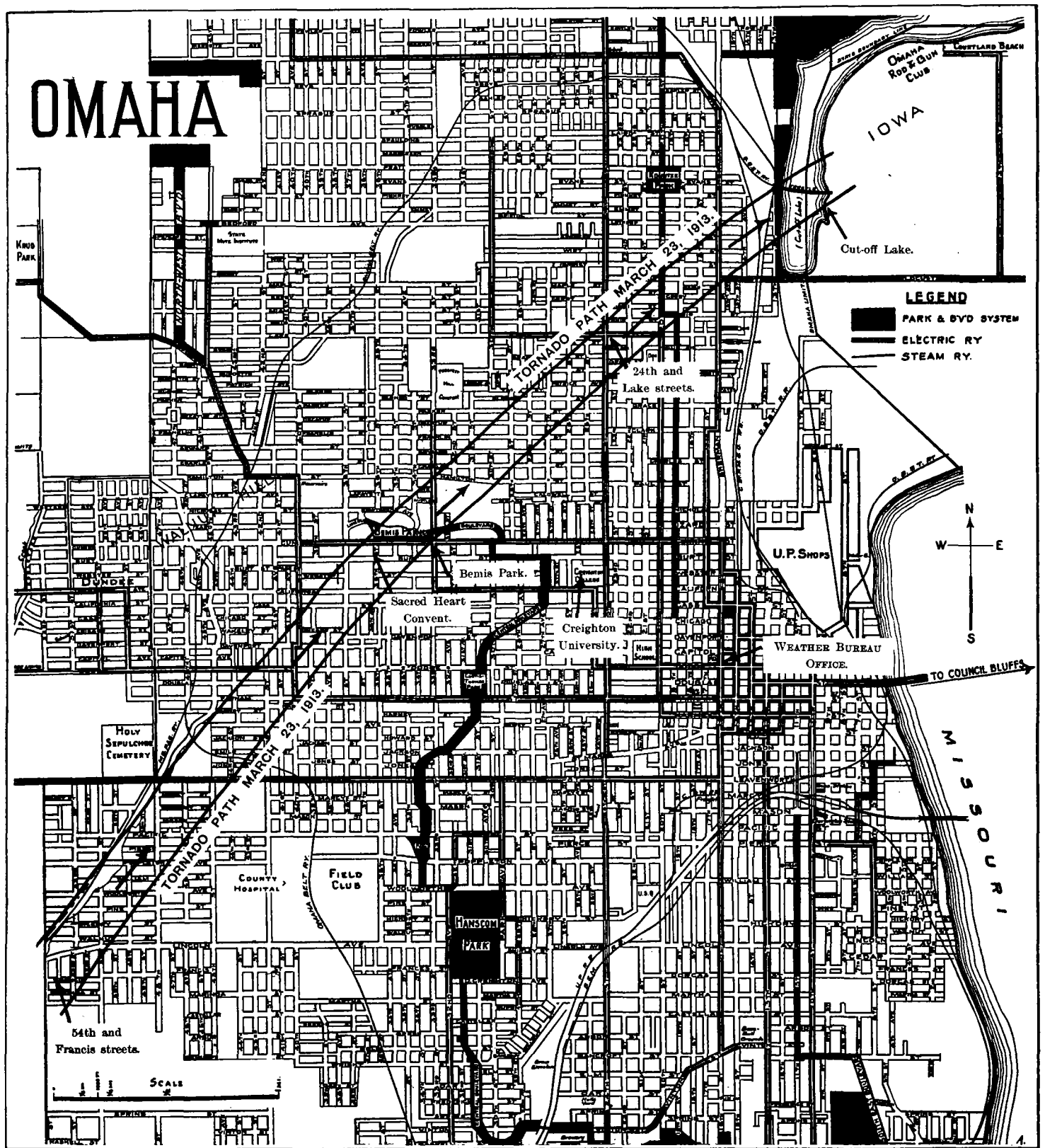
The center of the high pressure area that had persisted over the Canadian Northwest was, on the morning of the 24th, over Alberta, accompanied by temperatures below zero. On the following morning it was over eastern Manitoba, carrying the line of zero temperature into North Dakota, Wyoming, and Montana. On the morning of the 26th the high, with axis east-west, was central over northeastern Wyoming, and the line of zero tem-

peratures had advanced into South Dakota. On the morning of the 27th the high had passed to the west Gulf States, the line of freezing temperatures having advanced almost to the west Gulf coast and causing destructive frosts as far south as central Texas and thence eastward, except along the immediate Gulf and south Atlantic coasts and over the Florida Peninsula, and much damage is reported to have occurred to early fruit and tender vegetables despite the warnings. On the 28th the high was over western Kentucky, and frosts were reported over the northern portions of the Gulf and South Atlantic States, warnings of which were previously disseminated. By the morning of the 29th the center was over New England, and frosts were again reported over the northern portions of the Gulf and south Atlantic States and in Virginia. By the morning of the 30th the high had passed to the ocean. This high caused decided changes to colder weather over the great central valleys, and frosts in the Southern States, warnings of which were issued well in advance.

On the morning of the 27th storm warnings were ordered on the north Pacific coast, and during the ensuing 24 hours storm winds occurred in conformity with the warnings. The winds were due to the storm that was central on the morning of the 28th over Saskatchewan, with a trough extending into Colorado. By the morning of the 30th the center was over northern North Dakota with trough extending southward over the Plains States. A disturbance of ill-defined character had in the meantime appeared over southeastern Florida, causing rains over portions of the south Atlantic and east Gulf States. By the morning of the 31st the northwestern storm was over eastern Ontario, and the Florida disturbance had lost its identity in the trough which extended southeastward from the northern storm center to the Virginia coast. Storm warnings were ordered on the morning of the 31st for the Atlantic coast from Sandy Hook to Eastport, and during the 36 hours following storm winds and high seas occurred off the north Atlantic coast. The morning map of the last day of the month showed the center over Quebec. This storm caused precipitation from the Plains States eastward to New England. It was followed by a slight reaction to high pressure, and the evening map showed high centers of slight intensity over Missouri, South Dakota, and on the north Pacific coast, while low pressure prevailed over Quebec, the Southern Plateau, northeastern Texas, and Alberta.

THE OMAHA TORNADO, MARCH 23, 1913.

The tornado that passed through the city of Omaha on the evening of Easter Sunday, March 23, 1913, was undoubtedly the most destructive to life and property that ever occurred in the Missouri Valley and probably one of the most destructive in the history of the country. The storm attended by the pendent funnel-shaped cloud first struck the city at its extreme southwestern limit, Fifty-fourth and Frances Streets, and its track extended from that point northeastward across the western and northern portions of the city to Cut Off Lake, which is located near the Missouri River and in the extreme northeast portion of the city. The length of the tornado path between the points named was about 5 miles, and its width varied from one-fifth to one-fourth of a mile. The length of time consumed in the passage of the tornado across the city can not be exactly ascertained, but it is believed to be about 12 minutes. The funnel cloud crossed Fortieth and Farnam Streets at 5.49 p. m., and Twenty-fourth and Lake Streets at 5.55 p. m., having



Map of Omaha, Nebr., showing the path of the tornado of March 23, 1913.

traveled slightly more than 2 miles during the interval of 6 minutes, or at the rate of 20 miles an hour. The distribution of the wreckage and débris leaves unmistakable evidence of rotary winds and the presence of a whirl in the cloud at the points in the path where the greatest violence was shown and the greatest destruction occurred. This was particularly the case at the Sacred Heart Convent, at Thirty-sixth and Burt Streets, in Bemis Park, and at Twenty-fourth and Lake Streets. At other points along the path in the more open places the wreckage and débris lay in a general direction coincident with the path—that is, from the southwest to the northeast. A terrific grinding roaring noise that was distinctly heard for several blocks accompanied the storm.

The total number of persons killed in Omaha was 94. This includes those instantly killed and those whose death resulted from injuries received. The number of persons seriously and slightly injured will run into the hundreds. The greatest number of persons killed in any locality was in the vicinity of Twenty-fourth and Lake Streets, that section being the most thickly populated, and the houses there, being of poorer construction, were generally completely demolished. The number of animals killed was as follows: 33 horses, 4 cows, and 5 mules. The number of houses completely demolished was 600, and 1,129 were partially destroyed or badly damaged. The estimated property loss, including homes, furniture, personal property, wiring, poles, street cars, trees, fences, etc., is about \$3,500,000.

The following meteorological conditions were noted in connection with the passage of the storm, it being borne in mind that the Omaha Weather Bureau station for which the data are given is southeast of and about 1½ miles distant from the nearest point in the path of the tornado. The barometer, which had begun to fall on the 22d, continued to fall steadily during the day up to the moment of the passage of the storm, at which time the lowest pressure was recorded. The pressure then began to rise rapidly with marked fluctuations in its upward movement. At 7 a. m., the station pressure, not reduced to sea level, was 28.51 inches; at noon, 28.36; at 4 p. m., 28.17. The lowest reading, 27.93 inches, was recorded as the tornado passed, and at 7 p. m. the pressure had increased to 28.12. At 7 a. m. the temperature was 40° and continued rising until 4 p. m., when the maximum for the day, 68°, occurred. The sky was overcast with strato-cumulus clouds from the early morning until the middle of the afternoon, when for an hour or so it was only partly obscured. About 4.30 p. m. the sky again became overcast and grew more and more threatening and ominous in appearance until the terrible storm, approaching from the southwest, burst upon the city. At 5.10 p. m. distant thunder was heard, and rain began to fall and continued until 7.35 p. m., being heavy at intervals. From 5.40 to 5.50 p. m. small hail mingled with the rain. The prevailing wind for several hours preceding the storm was from the south, but for a period of 15 minutes before the storm struck it became very changeable, with increasing velocity, blowing from all directions. The general direction maintained during the passage of the storm was from the southwest. The extreme velocity of the wind recorded at the station during the storm was 34 miles an hour, occurring at 6.17 p. m.

As a further description of the meteorological elements accompanying the tornado, notes have been included which were made by Prof. A. R. Schmitt, a member of the faculty of Creighton University, which is located at Twenty-fifth and California Streets, or within eight blocks of the tornado path.

Prof. Schmitt says:

My attention was first called to the gathering of a storm at 4.30 p. m., when the cirrus sheet, which was spreading across the sky from west to east, obscured the sun. By 5 o'clock two-thirds of the sky was covered by the cirrus and a few scattered fractocumuli were scudding at a moderate altitude from southwest to northeast. At about 5.10 a light rain began to fall and after this there was considerable play of lightning among the clouds and an almost constant light rumble of thunder. There were, however, as far as I saw, no passages of lightning between clouds and earth at any time before the tornado had passed. At approximately 5.30 p. m. the clouds had lifted from the horizon everywhere, except for a very short stretch in the southwest. This last fact, the peculiar color of the sky—a muddy buff—and the time of day led me to suspect somewhat the approach of a tornado, but as the wind had shown no sign of veering, as I thought it should and the season was so early for a storm of this character, I abandoned the idea and returned to my desk. A quarter of an hour or so later the pronounced strengthening of the wind, the pelting of light hail at my windows, and the flickering of the electric light brought me out once more. And there was the funnel cloud coming down the hill southwest of us at about Fortieth Street. I looked at my watch—it was just 5.49. In front the funnel was sharply defined even to the very ground, and its circulation counter-clockwise, upward, and extremely violent was easily discernible. On either side, however, and in the rear, rolling clouds of dust and vapor hid the outlines of the funnel. I timed the forward progress of the funnel cloud after it had passed California Street and found it to be approximately 400 feet per 10 seconds. It was just 5.49 when I first saw the cloud at about Fortieth and Farnum Streets, and it was 5.55 when it crossed Twenty-fourth Street. It moved on much more deliberately than I had expected, the lower extremity dragging considerably behind the rest of the cloud. It was rather dark immediately in front of the funnel, but surprisingly light outside the path. The clouds above us hung very low and rushed by at great speed, but showed no gyratory motion. Immediately behind the storm the sky was clear up to the cirrus sheet. Above the funnel the cumulo nimbus was banked mountain high, much higher than I have ever seen it after the passage of a severe thunderstorm. Below long streamers of mist hung almost to the ground. At the same time the clouds over Council Bluffs had a similar appearance.

NOTE.—A chart showing the path of the tornado through the city of Omaha is reproduced herewith.

TORNADO AT TERRE HAUTE, IND., MARCH 23, 1913.

A report by the official in charge at Terre Haute on this tornado follows:

On the evening of March 23, at 9.45 o'clock, a severe local storm passed through the south end of Terre Haute less than 2 miles south of the station. The tornado crossed the Wabash River and entered the city at Voorhees Street. From this point it swept across the city in a northeasterly direction, Twenty-fifth and Hulman Streets being the eastern limit in this city of the zone of destruction. It consumed less than two minutes in traversing the city, during which time about 330 houses were demolished or badly damaged, 250 persons injured, and 21 lives lost. The width of the area of greatest devastation was about 100 yards, but property was damaged on each side of this track for at least 500 yards. The day began with a temperature of 39°, later rising rapidly to the 70° mark by noon. The afternoon and evening were oppressive. Rain began in the early morning and was nearly continuous all day. At 9.20 p. m. the rain became heavy and fell at the rate of 0.10 inch in 5 minutes. It continued at this rate for 25 minutes. During this heavy fall of rain the lightning was most vivid and the thunder of the heavy rumbling kind. At 9.45, the time the tornado was crossing the city, the barograph trace went down and up 0.10 inch in a very few minutes. * * * I have talked with several persons who were caught in the tornado. They saw the funnel-shaped cloud touching the ground in places and house after house crumble as it passed over them. They say the roar was deafening, and I was told by several persons that it could be heard for a mile. Many freakish things resulted: chickens were defeathered;